MI predicted the extent of LV dilatation at 16 weeks (p = 0.003). We conclude that the rate of left ventricular dilatation following MI in rats is proportional to initial LV function, which remains relatively constant as the ventricle enlarges.

1014-80 Increased Ventricular Sialylation in Ischaemic Heart Disease

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Elevated serum sialic acid is associated with increased cardiovascular mortality but sialic acid levels have not been studied in cardiac tissue.

Myocardial samples were obtained from ventricular explants at time of transplantation from 23 patients (age 54 ± 12 yrs) with ischemic heart disease (IHD) and 16 with idiopathic dilated cardiomyopathy (DCM) (WHO criteria). The normal control group comprised post-mortem samples obtained from 14 patients who died of non-cardiovascular causes (age 70 ± 5 yrs). Ventricular sialylation was quantitated using the sialic acid specific lectins *Maackia amurensis* (MAL II) and *Sambucus nigra* agglutinin (SNA) which identify α-2,3 and α-2,6 sialylation respectively, using a chemiluminescence assay.

Ventricular sialylation recognised by both the MAL II and SNA (expressed as mean ± SEM percentage of binding of lectin to control tissue) was increased in IHD patients compared to DCM and normals. No significant difference in ventricular sialylation was observed between the DCM and normals.

	IHD	DCM	normal
MAL II	55 ± 7	26 ± 7 (p < 0.01)	32 ± 3 (p = 0.04)
SNA	69 ± 7	42 ± 6 (p < 0.01)	38 ± 9 (p < 0.01)

For all groups, quantitation of MAL II and SNA showed significant correlation (r = 0.8, p = 0.0001).

Myocardial levels of sialic acid are increased in patients with ischemic heart disease compared to DCM patients or normals. Our results suggest a relationship between tissue sialylation and coronary athero-sclerosis which requires further investigation.

1014-81 Glycolysis Is Required for Normal Sodium Homeostasis in Perfused Rat Hearts

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Regulation of the K_{ATP} channel has been shown to be dependent on glycolytic ATP. Whether glycolysis (G) is essential for intracellular sodium (Na_i) homeostasis as well is unclear, particularly in the intact heart. To determine the relative importance of ATP derived from G or from oxidative phosphorylation (Ox Phos) in regulating Na_i, we examined Na_i content in isolated perfused rat hearts under four different states of metabolic inhibition: 1) N_2 hypoxia with 15 mM glucose, 2) substrate free hypoxia, 3) normoxia with 5 mM acetate and iodoacetate (IAA, 100 μm), and 4) normoxia, acetate, IAA, and low perfusate Ca^{2+} (≈0.25 mM) in order to examine the role of Na^+-Ca^+ exchange. Shift reagent aided [Tm(DOTP)$^{5-}$] triple-quantum filtered ^{23}Na NMR spectroscopy was used to monitor relative changes in Na_i. Results (mean values, n = 3):

Group	Glycolysis	Ox Phos	Na_i%baseline
1	YES	NO	115
2	NO	NO	245
3(nl Ca^{2+})	NO	YES	220
4(low Ca^{2+})	NO	YES	231

Thus, inhibition of G as opposed to Ox Phos correlates with an increase in Na_i. Diastolic Ca^{2+} as measured by macroinjected aequorin increased substantially in the presence of IAA and normal perfusate Ca^{2+}. However, group 4 results suggest that Na^+-Ca^{2+} exchange is not a primary mechanism of the rise in Na_i. These results suggest that glycolysis is essential for normal Na_i homeostasis in the perfused rat heart.

1014-82 Glycolytic Requirement for [ADP]: Effects on the Efficiency of Cardiac Energy Metabolism

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Previous studies on papillary muscle or isolated perfused heart have shown that switching from glucose to pyruvate containing medium results in a positive inotropic effect associated with an increase in phosphorylation potential. This study was designed to explore, by ^{31}P NMR spectroscopy in Langendorff perfused rat hearts, why removal of glycolytic restrictions can enhance cardiac energy metabolism. When hearts were switched from glucose to pyruvate containing buffers, there was a significant 22% increase in rate pressure product (RPP) with a decrease in [ADP] from 44 μM from 13 μM. Transitions from glucose to lactate containing buffers resulted in the same metabolic effect without significant increase in RPP. Transitions from glucose to glucose and dichloroacetate (DCA) resulted in an increase of glycolytic flux associated with a 2-fold increase in [ADP] with no concomitant change in RPP. The free energy derived from ATP hydrolysis (ΔG_{ATP}) was −58.1 kJ/mol, −60.9 kJ/mol, −65.8 kJ/mol, and −69.4 kJ/mol under glucose + DCA, glucose alone, lactate, and pyruvate containing buffer respectively. These values resulted in a decrease of metabolic efficiency from about 95% under pyruvate or lactate perfusion to about 85% under glucose or glucose + DCA perfusion. Overall these results clearly document a glycolytic requirement for [ADP] which results in a lower absolute value of ΔG_{ATP} and a 10% lower metabolic efficiency when hearts are metabolizing glucose. Therapeutic interventions designed to maximize glucose utilization thus increasing the P/O ratio must be approach with considerable degree of caution.

1014-83 Translational and Rotational Motion of the Right Ventricle

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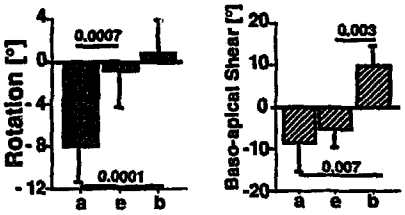
Myocardial tagging — a new noninvasive technique based on magnetic resonance — was used for the assessment of right ventricular (RV) rotational and translational motion.

Methods: In 12 volunteers the right ventricle was labelled with a rectangular grid (spacing 8 mm) in 3 short axis planes (base [b], equator [e], apex [a]) using a Philips ACS II (1.5 T) system. Rotation, translation and shortening were determined with high temporal (35 ms; 16 images per cardiac cycle) and spatial resolution (1.4 × 1.4 mm).

Results: The RV free wall performs a counterclockwise rotation at the apex but no rotation at the equator or base. The center of gravity moves inferior at the apex and anterior at the base with a transitional zone at the equator:



Conclusions: Myocardial tagging allows an accurate determination of RV motion. The right ventricle performs a counterclockwise rotation at the apex with a baso-apical shear. This complex motion pattern is largely influenced by a tethering effect of the left ventricle.

1015 Heart Failure: Clinical Management

Wednesday, March 27, 1996, Noon–2:00 p.m.
Orange County Convention Center, Hall E
Presentation Hour: 1:00 p.m.–2:00 p.m.

1015-29 Daily Activity Predicts Prognosis in Patients With Chronic Heart Failure

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There are many ways of assessing exercise intolerance in chronic heart failure but how they relate to prognosis is unknown. The use of maximal exercise testing has excluded large numbers of patients from previous mortality trials. Patient activity outside of the exercise laboratory may also be important. In 94 patients (mean age 64 years, 79 male) with moderate chronic heart failure we assessed treadmill exercise capacity using a modified Bruce and fixed workload protocol, corridor walk times and daily activity measured as footfall by pedometers. These were related to central haemodynamics regional blood flow, simple laboratory variables and prognosis. Patient follow up was 6–72 months over which period 44 patients (47%) died. Univariate analysis showed reduced daily activity (p < 0.001) and limb blood flow (p < 0.01) were predictive of death. Peak VO_2 (p < 0.01). resting cardiac output (p < 0.001) and mean arterial pressure (p < 0.001) were also related to a worse prognosis. Reduced survival did not relate to treadmill or corridor walk times. Of the non laboratory variables diuretic dose (p < 0.001), NYHA class (p